BOND REDEMPTION AND SINKING FUNDS

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Sinking funds in private finance are payments made by a corporation to the trustee of its bonds, to be devoted to the retirement of the bonds either at maturity, serially, or in instalments, usually annual. In kind, the sinking funds present an almost infinite variety. In effect, they are uniform. They tend to reduce the outstanding liabilities against the property of the corporation, and hence to enhance the value of the equity represented by the stock of that corporation.

In the case of public finance, government bonds, state bonds and municipals, the principle of the sinking fund is slightly different. The government and the municipality are not usually in business. They have no revenues except taxes, in one form or another. If it be accepted as an axiom that the public debt must be kept down to a fair parity with the property owned or governed by the public, then sinking funds become an expedient that comes close to being a necessity. For the correct principle of public taxation is that the people who enjoy, and benefit from, the public debt should be the people to pay it off. For instance, the people of New Rochelle, N. Y., decide to build new fire stations. Bonds are issued for those stations. The bonds have thirty years to run. It would not be right to allow the people of 1937 to meet the whole burden of paying off this debt, which will represent at that time not the new, efficient, and necessary plant of to-day, but a plant thirty years old, and probably obsolete. If such a bond be allowed to run to maturity without some sinking fund provision the people of 1937 will probably be obliged to finance not merely the maturing bonds but an additional amount sufficient to rebuild the plant from top to bottom. It is by such short-sighted methods that governments, and more especially local municipal governments, run into disastrous debt.

It is well to take up the question of corporation sinking funds somewhat *in extenso* before turning to the consideration of state

sinking funds in detail. In general, the writer does not believe that sinking funds for corporation bonds are good finance. The following objections may be noted:

1. *A certain sum to be used each year from current revenues to purchase the bonds of a certain issue at 110 and interest, or other such price. Illustration, the Nebraska Extension 4's, Chicago, Burlington and Quincy, 1927.*

A sinking fund of this sort establishes a fictitious price. In the case in point, it means that the revenues of the stockholders are diverted to the purchase of bonds at 110, which will, if allowed to run, be paid off at 100. Since the issue is a large one, the waste seems to aggregate nearly $2,500,000. There seems no good reason for the sinking fund at all.

2. *A certain sum to be set aside to be used in the purchase of a certain bond at certain times at a fixed price, or in other securities if the bonds named cannot be secured at the price. Illustration, Burlington and Missouri River, in Nebraska Sinking Fund debenture 4's.*

Such a sinking fund is of little or no use to the holders of the bonds in a receivership, because, after all, their main reliance must be in the property pledged under the mortgage. Moreover, in nine cases out of ten the other securities purchased are the bonds of other issues of the same system, and therefore exposed to the same risks as the bonds retired. Suppose, for instance, that this issue was found at maturity balanced in the accounts of the company against a collection of other branch line bonds of the Burlington system. What funds would be used to pay the holders of these bonds? Clearly, unless the company happened to have a great amount of cash on hand, it would be necessary either to sell the divisional bonds in the treasury or else re-finance the maturing bonds in some other bonds or stock. It is rather difficult to find out what advantage has been gained through the sinking fund, so far as the payment of the debt is concerned.

3. *A certain sum to be set aside to retire or call a certain amount of the bonds each year, say at par. Illustration, Republican Valley Railroad 6's.*

Few investors desire to purchase a bond that may be forcibly taken away from them at any time by lot. In particular, they do not want to buy such a bond at any price above the figure at which

it may be called. Of course, shrewd dealers figure the chances on such redemption, and often establish a price above the call price, but the average investor does not care for that kind of chances in his use of money. In some European countries municipal bonds are created with such an element of chance in the drawing for redemption that they come very close to the lottery ticket in their nature. If a man happen to get an early redemption, his profits may be over 20 per cent in the year. That is not a correct principle to introduce into the bond market.

4. *A certain sum to be set aside to purchase the bonds at a certain price, or to be used at the discretion of the trustees if the bonds cannot be obtained at that price. Illustration, Lincoln and Northwestern Railroad 7's.*

This provision speaks for itself. The fact that it is found mostly in very small mortgages on big systems reveals the doubt that naturally hovers around it. Suppose that it were applied to a mortgage for $100,000,000, with an annual sinking fund of $2,000,000. It would then provide the trustee, in years when the bonds were too high, with a comfortable little fund with which he could do pretty much as he liked, within reason. Certainly, the principle of such a provision is susceptible of no defense.

In general, there can be little defense of the sinking fund as a financial expedient in railroad or corporation finance. It is difficult to see by what right the stockholders of the Chicago, Burlington and Quincy are asked to give up each year over $700,000 of their revenue to form a fund for the protection of the bondholders. If it were a fact that the property upon which the bonds are liens was wasting through decay, or deteriorating through use, then there would be some reason in it; but since the mortgage in most cases provides that no such waste or decay may take place, and since the stockholders yearly contribute in maintenance charges more than enough to keep the property in the condition called for under the mortgage, it seems transparent that the sinking fund charge is a burden quite unnecessary, and perhaps even unjust.

Of course, it may be argued that the stockholders get the ultimate benefit of the retirement of the bonds. When a student of finance undertakes to analyze the value of the stock of the Chicago, Burlington and Quincy he always reckons the sinking funds as belonging to the stockholders. But the average stockholder would

much prefer to have his profits in money. In the case in point, the old stockholders of the Burlington, whose sacrifices built up the sinking funds so largely, sold out of their stock in the years that followed the great decline of the early days of the last decade, and the profit of the self-sacrifice made by those stockholders has gone to Mr. J. J. Hill and his friends, or to the Great Northern and the Northern Pacific it may be. In a general way, it is not usually a good thing for the stockholder to be quixotic, or to build with an eye single to the interests of to-morrow, for the history of our great corporations has shown indubitably that where one sows, often in tears, another reaps in joy.

The principle of the sinking fund in operation in the bonds of a corporation of this nature is hardly defensible, yet many have defended it. In this past year, so able a financial writer as Mr. Edgar Van Deusen, former instructor in finance at Tuck School, Dartmouth College, writing in the "Bankers' Magazine," stated his thesis in the following words:

"It is a significant fact that all the strong companies of the Northwest have developed in connection with their sinking fund policy, until to-day they occupy an almost impregnable position. The sinking fund, besides constituting a safety fund for those particular bondholders, furnishes a proper outlet for the uncommonly large earnings of strong corporations. It may be claimed that exceptional earnings should be paid to shareholders rather than held as a trust fund for the benefit of a certain class of creditors. But where this latter course is followed, and the indebtedness proportionately reduced until the property is so far free from encumbrance, the sinking fund payments *ultimately* accrue to the benefit of the stockholder through the resultant increase in the absolute value of the property, while in the meantime of protection to the bondholder. Furthermore, unusually high dividends are never paid regularly to stockholders, but the surplus remains as an unappropriated fund which may be easily 'juggled' by an unscrupulous management for their own advantage and the company's possible detriment, when it has no predetermined use as a sinking fund. Such a provision, accordingly, seems desirable to both bond and stockholder, even in the case of strong corporations."

Since this view is widely held, and has many strong advocates, it is as well to take it up in some detail. Let us look,

for instance, at the "strong companies of the Northwest," above referred to. Did the profits through sinking funds "ultimately accrue" to the stockholders who provided them? The Union Pacific, the Oregon Short Line, the Oregon Railroad and Navigation Company and the Northern Pacific passed through reorganizations of various sorts, and it is difficult to see how the original self-sacrifice of the old Northern Pacific Railway stockholders has been repaid in profits. Without going into detail with regard to the various changes that have come to the roads above mentioned, it may be stated that they are evidently not meant in Mr. Van Deusen's statement.

He refers, then, to the Burlington, the Northwestern and the Great Northern. The last named has about $12,000,000 in its sinking funds, in the old bonds of the St. P., M. & M. R. R. The writer has never heard it advanced as a great reason for the value of the stock of the Great Northern Railway that this sinking fund existed, and he cannot believe that it is more than an infinitesimal factor in the value of that stock. The case of the Burlington is touched upon in previous paragraphs. The Chicago and Northwestern is a better client for the advocate of the sinking fund, but even here it would be difficult to prove that more than a very small percentage of the stockholders who built up the sinking funds to over $10,000,000 in 1901 reaped much advantage from the prices that have ruled in this stock this past year or two; for the road was nearly captured by the Moore Brothers and their associates in 1902, and the ownership shifted radically.

As to the "juggling" with the surplus, such an episode is surely rare. The great magnates seldom confine their "juggling" to the small amounts that accrue to the income surplus from year to year. The "juggling" of the Rock Island, the Cincinnati, Hamilton and Dayton, the Pere Marquette, the Chicago and Alton, the Union Pacific, was not done through an income account. It was done through capital account in almost every instance. Men have at times "rifled the sinking funds," plundered the capital account, split the stocks, robbed the improvement accounts and done various other high-handed acts of financial piracy for personal gains on a large scale, but I cannot recall a case from my own experience where any great financial wrong was worked upon the stockholders through the appropriation of the income surplus. Petty wrongs

are easy to remember, but "juggling" on a large scale has always been done through other agencies.

Turning from the strong companies, it is time to make inquiry as to the effect of a sinking fund on the weak companies. The history of finance tells the story clearly enough. In cases where it has become necessary to save the corporation, the sinking funds are passed without much hesitation. It will be found that it is difficult, in many cases impossible, to enforce the payment of the sinking fund as strictly as one may enforce the payment of interest or principal. As a matter of sober fact, the trustee of the mortgage is generally found to be pretty complacent, and he will not go into court to throw the road into the hands of a receiver to collect the sinking fund. If he should do so, and there should be a sudden collapse in the prices of the bonds, the bondholders would be the first to execrate him. A sinking fund is not supposed to break a company. A weak corporation, striving to build up its property, can gain no benefit through being obliged to take in some of its older and better established bonds each year. If the money used for such a purpose is appropriated directly for improvements and additions, the benefit is far more direct and the company gains far more strength than it could gain through the sinking fund.

That this is recognized may be happily illustrated from the record of the Rock Island Company. When the Chicago, Rock Island and Pacific Railway Company bought the Choctaw, Oklahoma and Gulf it issued for that stock its collateral trust bonds, payable in series up to 1918. No provision was made at the time for paying the annual instalments, amounting to about $1,475,000, except from the earnings of the Chicago, Rock Island and Pacific. It was soon seen, however, that the payment out of income was a burden, and surely an unjust one, for why should the stockholders sacrifice a large part of their surplus to buy stocks for the capital account? Therefore, when the refunding mortgage was made, in 1904, provision was made under it for the payment of these serial instalments. To-day the Rock Island appropriates its income surplus directly for the purchase of equipment and for improvements. Who will say that the change is not to the benefit both of the property and its stockholders?

It is as well, having gone thus far in the discussion, to define this criticism of the sinking fund principle, lest it be thought that

the criticism applies with equal force to *all* corporation sinking funds. The conclusion to which the study of the question points may be stated as follows:

That sinking funds are not advisable, but rather are unjust, when applied to bonds that are issued to purchase or create permanent additions to the capital account, or properties that will permanently establish new earning capacity for the property of the corporation.

It is on this word "permanent" that the whole discussion hinges. When bonds are issued to purchase some property that will waste with time or will entirely disappear in a few years, taking its earning capacity with it, the sinking fund is not only advisable, but it is necessary, if the corporation will avoid the evil of stock and bond watering. If a company issues $4,000,000 of bonds to purchase a coal mine containing 2,000,000 tons of coal, and takes all the coal out within five years, the bonds remain as a permanent charge against the earnings of the corporation, and future stockholders are assessed to pay interest on capital from which they derive not one dollar of benefit. In every such case there should be a sinking fund.

A good sinking fund of this sort, established on a sensible and sane, but rather peculiar, principle, is the fund of the Reading Company and Philadelphia and Reading Coal and Iron joint general gold 4's, of 1997. The sinking fund provision is as follows:

"That the Reading Company shall not, in any year, pay a dividend on either class of stock until it shall have paid to the trustee five cents per ton of anthracite coal mined in the preceding year from the Coal and Iron Company's lands to an amount not exceeding the amount of dividends in such preceding year. This sum is applied to the purchase of these bonds, at not exceeding par. If bonds are not obtainable at that price, the fund is to be invested in such securities as are legal for New York savings banks."

For the sake of clearness, the provision is here taken from Moody's Manual for 1907, rather than from the mortgage.

Similar funds will be found in operation in nearly all conservative coal mining companies, though the provisions as to call price, investments, etc., will vary in each case. The principle, of course, is that the bonds shall be retired contemporaneously with the exhaustion of the coal. Similar arrangements are usually

made in the bonding of a lumber tract, a land company, or any body of property purchased to be resold. The Canadian Pacific has recently retired the last of its land grant bonds against balances unpaid by the purchasers. In such mortgages, where agricultural land underlies the mortgage, a sinking fund is usually based upon a percentage of the aggregate amount received in any one year for lands sold; but this, of course, is arbitrary, and varies greatly. It will be found that the railroads of the United States generally observe as axiomatic that such wasting properties as land, timber and coal demand a sinking fund on the bonds. In respect to coal, the same principle is generally observed throughout the long list of small independent companies.

Unfortunately the industrial companies are not, as a rule, so soundly financed in this respect as are the railroads. The United States Steel Corporation and many others of the big companies have established sinking funds with their bonds on wasting properties, but only a small percentage of the little, scattered companies have been so conservative. Frequent cases could be cited where a lumber development company, a paper company, a land company, or a mining company has depleted its fixed assets year by year, paid dividends to its stockholders, then finally left the bondholders to foreclose on stripped timber lands or empty holes in the ground. It is too ordinary a story to need elaboration.

From this fact arises the rule, so strongly enforced in conservative banking circles, that all industrial bonds must be carefully scrutinized before purchased. It is not advisable to make any permanent investment in industrial bonds secured on wasting properties unless the sinking funds are liberal. In a very general way the nature of the sinking funds for various industrial corporations may be itemized:

Coal Company.—A royalty of two cents to ten cents per ton mined, per annum, to be invested in the bonds at a fixed price. Drawing by lot is advisable.

Land Company.—Fixed sum per acre or lot sold, the aggregate amount being sufficient to retire the whole issue contemporaneously with the sale of the last acre or lot.

Manufacturing Company.—An annual "renewal fund," quite apart from the "improvement fund," sufficient to replace the plant when it is worn out. The period varies. If the machinery will

last ten years, on an average, the fund should be ten per cent of the cost, or of the bonds issued for plant. A manufacturing plant without this sinking fund against its bonds, or stocks, or floating liabilities is practically certain to over-capitalize sooner or later.

Lumber or Paper Company.—A charge of so much per thousand feet on lumber cut, or so much a cord on pulpwood cut, sufficient to retire the bonds at exhaustion of the property. This fund should be compulsory, and clearly stated as such in the mortgage, with proper penalties attached.

Steamship Company.—Annual "depreciation fund" sufficient to replace the tonnage in the fleet when worn out.

This is, of course, intended to be merely an illustration of the principle upon which the sinking funds should be established. It is not at all intended to be exhaustive. It is not too much to say that every manufacturing company that issues bonds against its buildings, its plants, its supplies of raw material, must have sinking funds. If it does not, its business will have to carry an ever-increasing burden of capital. Suppose a sugar company has outstanding $50,000 of five per cent bonds against its plant, maturing in thirty years. The entire plant will be worn out in fifteen years, let us say. New buildings must be erected and new machinery put in. How is it going to be done? If there has been no sinking fund, that issue of $50,000 must stand as a first lien against the renewed plant. Presumably it will take at least as much again to renew. The debt against the plant at the maturity of the first mortgage will be $100,000. If there have been no sinking funds at all, the plant will be again worn out, and the assets of the bonds maturing will be practically nil.

Turning again to the railroad field, attention to-day centers upon the question of paying for the millions of dollars' worth of new engines and cars that are constantly made necessary by the increasing flood of traffic. Here is a field in which the sinking fund principle is generally insisted on by the best and most conservative critics. In general, the critics take the ground that all equipment added to the rolls of an established railroad system should be paid for out of current earnings within the lifetime of the equipment. In cases where the accumulated earnings are not sufficient to pay for the required engines and cars in a lump sum, the sale of serial equipment bonds or notes—usually called equipment trusts—is ap-

proved. The most extreme of the critics would not allow the permanent bonding of any new equipment except what is included in the original cost of the completed property.

As railroad editor of the *Wall Street Journal,* the writer, on a previous occasion, took this attitude in criticising the new refunding mortgages of the Chicago, Rock Island and Pacific and the Colorado and Southern, when they were created. It seemed right to deplore the tendency of the financiers at the present time to place practically all their new equipment under permanent mortgages. That this tendency exists is well known. Yet reflection and study of the equipment situation throughout the country have tended to at least soften, if not to change, the opinion expressed at that time.

Applying the general principle that all permanent additions to the plant should be financed under permanent mortgages and all temporary additions by bonds or notes under sinking funds, the division of the equipment charges of the road may be made with justice. Renewals of the original equipment covered by the construction mortgages, or of any equipment bought subsequently under bond issues and pledged with the trustee of those mortgages, or even not pledged, should come out of the current revenues. This is usually accomplished by means of a "replacement fund," not peremptory but optional with the directors. The fund is built up in good years, and carried as a liability in the balance sheet.

The object of such a fund should be not to increase the earning capacity of the property so much as to maintain it. At all times during the life of a railroad the earning capacity represented by the equipment put on the road at building and subsequently added through permanent financing should be kept intact without resource to the capital account in any way. It should not, theoretically, be increased out of current revenues. Of course there comes in the history of most railroads a long period during which the plant is allowed to run down. The property, and more especially the equipment, is scientifically skinned by the management for personal profit, to pay dividends or to "make a showing." The waste through such process should be made good out of earnings, without recourse to capital account. Such a process has been in action on the Southern Pacific, the Santa Fé, the Union Pacific and many other railroads throughout the past few years.

When, however, it is necessary to add new equipment, increas-

ing the number of locomotives, the number of cars, or the capacity of either the motive power or the rolling stock, it is right to call upon the capital account to make the additions. For instance, the Union Pacific in 1906 added seventy-four locomotives. One was charged to replacement and seventy-three to "free assets," *i. e.*, to capital. That seems just. The point of the distinction is that the addition of new equipment, increasing the earning power of the property as a whole, simply increases the value of the road as a whole, and creates new property which must be maintained and renewed out of earnings, but should not be created in that way.

In the case of the St. Louis and San Francisco Railroad, for instance, we have a property that was built through a territory and to reach traffic that did not demand a heavily-equipped railroad plant at the outset. Let us suppose that the new lines of this company through Texas and the territories, were built at the outset for $15,000 per mile and equipped for an additional $6,000 per mile, and that securities to the aggregate market value of $21,000 per mile were issued against this line. Not even the most radical exponent of the sinking fund idea would claim that it is incumbent upon the management to make provision for a sinking fund against these securities. The fact that the equipment put on the line will all be worn out in twenty years has no weight. The point seems to be that the earning capacity which is created by the use of this equipment is a permanent earning capacity and may properly be made subject to long term bonds and take its place under the item "property and franchises" in the balance sheet of the company.

The equipment thus created should always be maintained and renewed at the expense of the stockholders. In other words, at the end of twenty years there should be, on this line, in working order, equipment worth this $6,000 per mile, which has not been created by an additional call on the capital account. If, however, it has been necessary in the meantime, to add very largely to the capacity of the equipment on the line, such addition may very properly be charged to capital account and financed under a permanent mortgage without a sinking fund.

This distinction will draw the line pretty clearly between the two kinds of additions to property which should be financed under sinking fund and permanent securities respectively. The first class,

which are really replacements or renewals and which merely perpetuate the value created in the first place by the construction financing or by permanent financing subsequent to the construction, are very properly carried out under serial or sinking fund bonds or notes. These securities, known as equipment bonds, equipment notes, or car trusts, may be found in great abundance in the list of latter-day financing. The student may consult the records of the Missouri Pacific, the Norfolk and Western, or the Central of New Jersey for examples of equipment serial bonds. The St. Louis and San Francisco will afford plentiful examples of the equipment notes. The Pennsylvania issues car trusts in abundance. Here and there one may find equipment replacement financed under regular sinking fund bonds, as in the case of the Buffalo, Rochester and Pittsburgh 4½'s of 1922. Convention and practice have established a rule that sinking fund or serial issues of this nature are a lien on the entire amount of the equipment purchased until the last of the securities are retired.

Turning from the field of private finance to the question of sinking funds on government and municipal debts, the variety becomes almost infinite. It is recognized as a rule that the debts of states or municipalities, based as they are upon assessments and the taxes levied on the basis of such assessment, should be amortized through sinking funds. The usual method of establishing such a fund for the issues of municipalities is to provide in the resolution creating the debt for the payment out of taxes of a certain amount year by year to be invested in the bonds either by purchase or by drawing. The bonds so called are generally kept alive in the sinking fund, and the interest is added to the fund for redemption of the bonds. There are, however, hundreds of variations of this method.

To cover the variations and the phenomena of such sinking funds in detail would be an endless and a thankless task. A general outline of the subject may be gathered from an analysis of the methods used by the states for the making of their sinking funds, and the uses to which such funds are put. The aggregate of such funds in the states is put, in the latest government returns, at $35,-281,201, divided as follows:

North Atlantic	$25,884,288
South Atlantic	6,461,653
North Central	1,274,890
South Central	390,128
Western	1,270,242
Total	$35,281,201

Of this the State of Massachusetts holds $18,304,730, or over fifty per cent. Of the other states, Maine, New Hampshire, Vermont and Connecticut of the first division; the District of Columbia, West Virginia, North Carolina and Georgia, of the second division; Illinois, Wisconsin, Iowa, Nebraska and Kansas, of the third division, and Wyoming, Utah, Washington and Oregon, of the fifth division, have no accumulated sinking funds; while in the fourth division but two states, Kentucky and Arkansas, have such funds.

The following distinctive funds may be cited:

Arkansas.—Since 1899, an annual tax of one mill on the dollar has been levied against taxable property to provide a "general sinking fund" out of which all obligations are to be met.

California.—The San Francisco depot fund consists of monthly payments of $4,631 made by the harbor commissioners out of collections, to be used to pay interest on the harbor improvement loan and to retire it at maturity. This fund is invested in United States bonds—a very wasteful investment.

Colorado.—The capitol, casual deficiency, Cripple Creek insurrection and Leadville riot bonds are to be retired by a sinking fund based on taxes to be levied some years after the date of the bonds, sufficient to create an annual fund amounting to twenty per cent of the issues.

District of Columbia.—It is noted above that there are no sinking funds on hand. By an act of 1878, the commissioners were abolished, and the Treasurer of the United States took command. He has construed the law to mean that he can buy with the funds any of the bonds of the District and cancel them. Therefore the fund disappears as it is created.

Florida.—Sinking funds were made for the 1871 and 1873 bonds, based on annual taxes for interest and one per cent of the principal of the 1871 bonds and an annual tax of one mill on the dollar for the 1873 issue. In 1901 the bonds of 1871 in the fund

were canceled and the cash in the fund transferred to the general revenue of the state.

Georgia.—The constitution of Georgia requires the assembly to raise $100,000 per annum for sinking funds, but it does not appear that the constitution has been respected to any great extent.

Kentucky.—The sinking fund in Kentucky is derived from a tax of five cents per $100 of taxable property and the income from some stock investments. In this state, as in some others, the "general fund" appears to be able to make an occasional overdraft on the sinking funds.

Massachusetts.—Sinking funds in this state are very numerous. In general, they start with the deposit of the premium over par received for the state bonds when sold. In the case of bonds issued to aid railroads, the fund is usually based on an annual payment to the state by the railroad. In 1867, a state issue to assist the Boston, Hartford and Erie Road was provided for by a charge of $50,000 per annum against the road, supplemented by an additional charge of $20,000 against a new bond issue in 1869. By 1890 this fund had grown so big that it was sufficient to retire the bonds at maturity. It was, therefore, diverted to help meet other sinking funds. The state has reserved to itself the right to change its sinking fund provisions from time to time. The principal funds of the state are as follows: The bounty loan sinking fund, coast defense sinking fund, Boston, Hartford and Erie sinking fund, Troy and Greenfield sinking fund, closed and the specified bonds paid; prison and hospital loan sinking fund, statehood loans sinking fund, Fitchburg Railroad securities sinking fund, Medfield Insane Asylum sinking fund, state highway loan sinking fund, abolition of grade crossings loan sinking fund, harbor improvement loan sinking fund, and Massachusetts war loan sinking fund, alive and in operation at the date of the government report.

Minnesota.—The sinking funds of Minnesota are of two classes, the first being raised by taxation and the second from proceeds of the public lands set aside by the legislature to meet the old debt of the state.

Montana.—There are six sinking funds in Montana, all derived from the proceeds of land grants made to the state by Congress.

New Jersey.—The small state debt of New Jersey is amply provided for, the sinking funds being greater than the entire debt

in every year since 1897. A unique provision in this state is that the treasury may be called upon to make up a deficiency in the sinking fund, the same to be paid back as the funds come in.

New York.—All the bonds issued by New York State between 1890 and 1902 were serial bonds, and therefore needed no sinking funds, except the canal bonds. The sinking funds therefore consist of a part of the canal fund of the state.

Ohio.—The constitution requires an annual sinking fund of $100,000, to be gathered from the sale of lands, public works, or stocks owned by the state, from the income earned by the profit-producing public works and the stocks owned, and from a tax to be levied to make up any deficiency left by the above sources of revenue.

North Carolina.—This state has two classes of sinking funds, the "ordinary" and the "cumulative phosphate" sinking funds. The income of the latter is derived from royalties on phosphates, amounting to $37,500 per annum. Both funds are now invested in the bonds of the state, without cancelation. A third fund, for insurance, is not included in the regular government report of the sinking fund, but is treated separately.

Virginia.—The sinking fund provision in Virginia is very elaborate. The fund is based largely upon the stocks and bonds of railroad and canal companies held by the state, both the income and the principal of such investments being included. The fund is based on the securities owned prior to 1875, but the law of 1894 supplemented this fund by the addition of all revenues received by the state from its interest in the work of internal improvement.

It will be noted that there is no great uniformity in the maintenance and operation of these state funds. Nor does the amount of the funds at a certain date have much meaning, because such amount is made up only from the cash or bonds or stocks held alive in the fund. In cases where the sinking funds are immediately invested and the bonds canceled, the amortization of the debt goes on, but the government report does not show it. This process is followed to some extent in nearly every state, and many of the states that are reported by the government to be without sinking funds are steadily reducing their debts by cancelation.

In the whole field of study covered, however imperfectly, in this review, there is one particular feature that should be recom-

mended to the attention of the private investor. It will be found in the laws of Massachusetts with respect to the sinking funds. That state provides that when its bonds are sold *at a premium* the full amount of the premium goes into the sinking funds. That law is a recognition of a principle that too few private investors understand. The principle, which is the chief application of the sinking fund principle to the investments of the private individual, may be stated briefly:

Bonds bought at a premium for investment are wasting investments, and unless the buyer establishes a sinking fund against the premium paid they are necessarily losing investments if held to maturity.

Let us take as an example a 6 per cent bond for $10,000 bought in May, 1907, for $12,000, and due May 1, 1927. If the whole annual income of $600 is considered income, and spent, the investor will find when the bond is paid off that he has spent as current revenue $2,000 of his principal. Of course, every man who knows anything about investments knows this fact, but, unfortunately, far too many investors seem to forget it.

Following this example, let us determine how much should be set aside out of each semi-annual interest payment as a sinking fund to equalize the waste in the value of the bond. The following is a partial table, to cover investments at 4 per cent, 5 per cent and 6 per cent, for periods from 10 years to 25 years. It is based upon the idea of withdrawing a certain fixed part of the revenue each half year and depositing it in a savings bank or trust company to receive interest at the rate stated, compounded every six months, through the period stated. For convenience, the table shows the amount to be deposited to absorb a loss of $1,000 during the period named:

Years.	Four per cent.	Five per cent.	Six per cent.
Ten	$40.35	$38.19	$36.13
Eleven	35.91	33.80	31.79
Twelve	32.23	30.16	28.20
Thirteen	29.12	27.09	25.18
Fourteen	26.46	24.48	22.62
Fifteen	24.17	22.22	20.41
Sixteen	22.17	20.26	18.49
Seventeen	20.41	18.54	16.82
Eighteen	18.86	17.03	15.34

Years.	Four per cent	Five per cent.	Six per cent.
Nineteen	17.47	15.68	14.03
Twenty	16.23	14.47	12.88
Twenty-one	15.12	13.39	11.84
Twenty-two	14.11	12.42	10.90
Twenty-three	13.19	11.54	10.06
Twenty-four	12.36	10.74	9.30
Twenty-five	11.50	10.00	8.61

In the example cited above, the investor should put into his sinking fund $32.46 each half year if he can get only 4 per cent, $28.94 if he can get 5 per cent, or $25.76 if he can get 6 per cent. At the end of the twenty-year period he will find the loss of $2,000 on his principal exactly balanced by his bank account. Any trust company or banking house can supply the tables needed by the investor to enable him to calculate for himself the sinking funds he should have established against his investments at a premium.